## (19) World Intellectual Property Organization

International Bureau





(43) International Publication Date 18 August 2005 (18.08.2005)

PCT

## (10) International Publication Number WO 2005/076339 A1

- (51) International Patent Classification<sup>7</sup>: H01L 21/318, 21/316, 29/78
- (21) International Application Number:

PCT/JP2005/002378

- (22) International Filing Date: 9 February 2005 (09.02.2005)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:

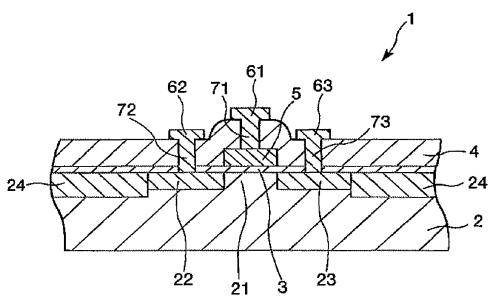
2004-033960 10 February 2004 (10.02.2004) JI 2004-306228 20 October 2004 (20.10.2004) JI

- (71) Applicant (for all designated States except US): SEIKO EPSON CORPORATION [JP/JP]; 4-1, Nishishinjuku 2-chome, Shinjuku-ku, Tokyo 163-0811 (JP).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): MIYATA, Masayasu [JP/JP]; c/o Seiko Epson Corporation, 3-5, Owa 3-chome, Suwa-shi, Nagano 392-8502 (JP).

- (74) Agents: ASAHI, Kazuo et al.; Nishi-Shinbashi Noa Bldg. 4th Floor, 18-9, Nishi-Shinbashi 1-chome, Minato-ku, Tokyo 105-0003 (JP).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: A SEMICONDUCTOR DEVICE, AN ELECTRONIC DEVICE AND AN ELECTRONIC APPARATUS



(57) Abstract: A semiconductor device 1 includes: a base 2 mainly formed of a semiconductor material; a gate electrode 5; and a gate insulating film 3 provided between the base 2 and the gate electrode 5. The gate insulating film 3 is formed of an insulative inorganic material containing silicon, oxygen and element X other than silicon and oxygen as a main material. The gate insulating film 3 is provided in contact with the base 2, and contains hydrogen atoms. The gate insulating film 3 has a region where A and B satisfy the relation: B/A is 10 or less in the case where the total concentration of the element X in the region is defined as A and the total concentration of hydrogen in the region is defined as B. Further, the region is at least a part of the gate insulating film 3 in the thickness direction thereof.



## WO 2005/076339 A1



## Published:

- with international search report
- with amended claims and statement

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.